EFFECTS OF ENVIRONMENTAL CHANGE ON RADAR BACKSCATTER IN TI E OREGON TRANSECT

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Abstract

During multisensor experiments in the Oregon Transect Ecosystem Research (OTTER) project, several remote sensing instruments, including the JPL AIRSAR, collected data over six study sites in western Oregon. The SAR flights took place in June and August 1990 and March 1991. The primary objectives of OTTER were to test an ecosystem model, driven by quantities such as biomass and leaf area index, that predicts the fluxes of the basic nutrients in a forest ecosystem, and to establish whether the inputs to the model could be acquired from remotely sensed data. The sites ranged from the dense forests of the coastal region to the sparse inland Juniper forests, thus providing a wide range of above-ground biomass values (8 Tons/HA to 960 Tons/HA). We have previously reported the results of studying the polarimetric SAR data from June 1990 (Moghaddam et al., *Proc. IGARSS'92*, pp. 1135-1137). Here, we concentrate on March 1991 data. These data were obtained under flooded conditions and colder temperatures. The variations of radar backscatter with biomass and other forest parameters, such as height of the trees and total basal area, are studied and compared to those from June '90.

The radar images from the two dates were coregistered, so that an accurate comparison (within the accuracy of registration) could be made. Differences between the two data sets due to calibration errors are small. Since the above-ground biomass was almost the same for both experiments, any change in radar backscatter must be mainly due to environmental variations such as higher precipitation and temperature differences. These elements can significantly impact the dielectric constant of the forest components, thus giving rise to different radar measurements. We have studied the differences in radar backscatter for several selected sites, which will be discussed in this presentation. Differences between radar backscatters of several dB have been observed. Our observations substantiate our earlier findings that the radar measurements cannot be uniquely related to biomass, and that instead, inversion algorithms need to be used. With the knowledge of the environmental conditions and the forest structural parameters, it might then be possible to calculate the values of biomass.

This work was performed by the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, under a contract from the National Aeronautics and Space Administration.